Fabrication, Characterization, and Theoretical Analysis of Apatite-Based Films

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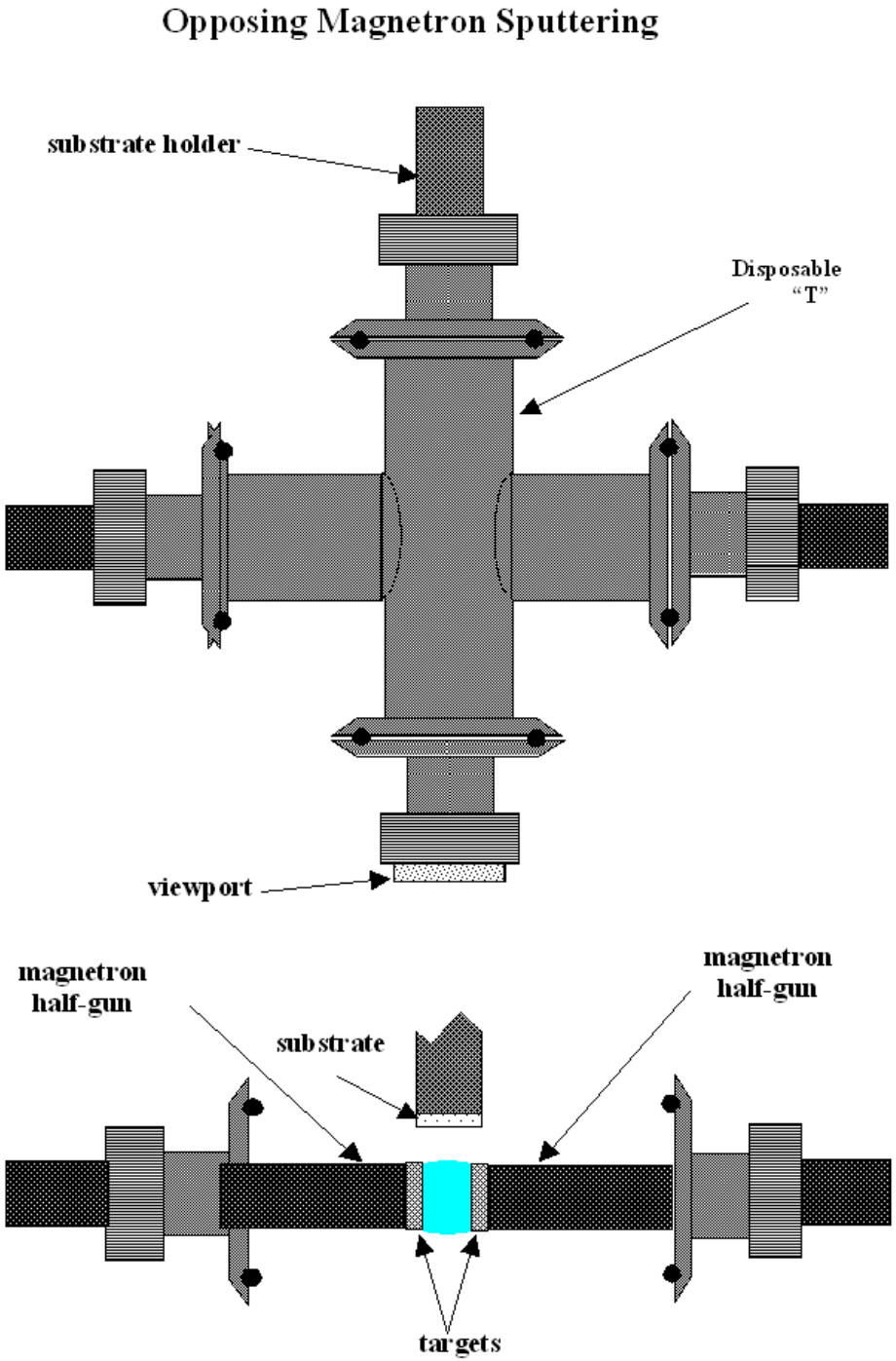
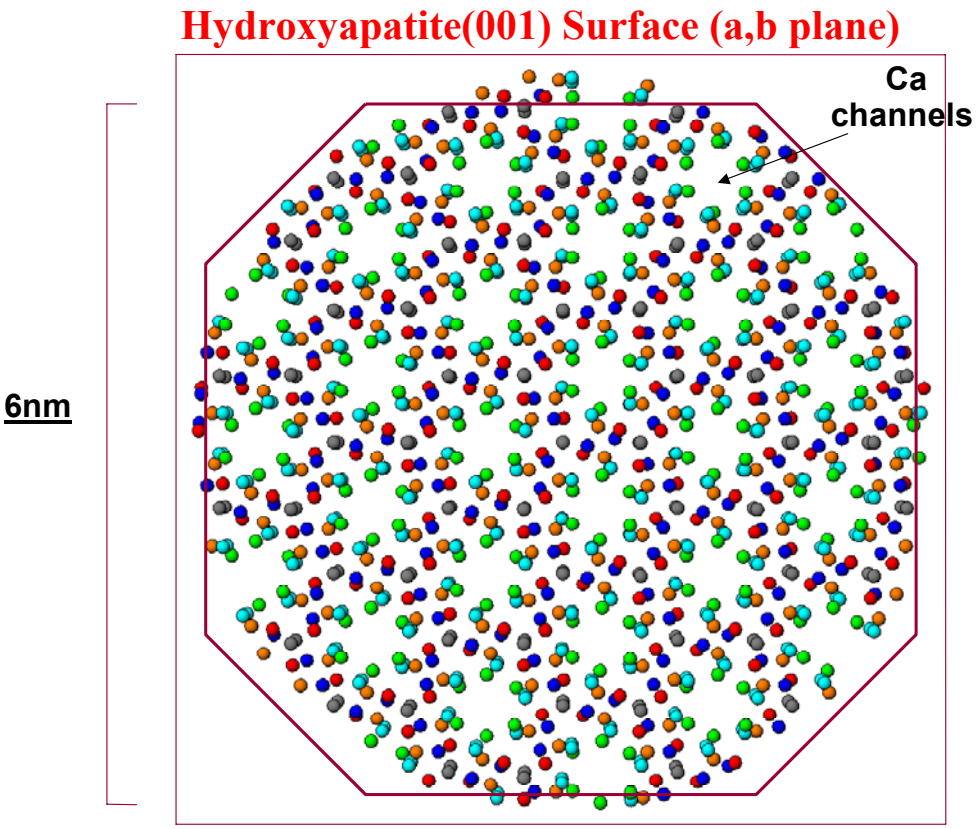
Within the Inter-American Materials Iniative, in collaboration with A. Rossi (Centro Brasileiro de Pesquisas Fisicas), we are developing novel magnetron sputtering techniques for producing highly controlled phosphate thin films, starting from ultrapure nanoparticulate targets. The films are characterized for morphology and composition, and compared with theoretical atomistic simulations and Density Functional models.



The apatite structure has important biological, ion-exchange and catalytic properties.



- In addition to being the principal mineral component of bone and tooth, apatite is an effective ion-exchanger, with applications to wastewater and soil remediation, sequestration of metals, and ‘green’ catalysis. We are studying uptake and retention of metals, focusing on surface properties and bulk stabilization. Theoretical methods used were highlighted at the NSF School on Nano-mechanics and Materials in June 2004.